Example Paper 4

1. **Scheduling via LP**

A chemical plant requires different number of employees on different days of the week.

|  |  |
| --- | --- |
| Day | Number of employees required |
| Monday | 10 |
| Tuesday | 12 |
| Wednesday | 20 |
| Thursday | 17 |
| Friday | 15 |
| Saturday | 12 |
| Sunday | 5 |

Table 1: Number of employees required on each day of the week

Formulate a linear program that will determine the number of people required on each day of the week. The company has a shift pattern of working for 5 consecutive days then two days off.

1. **Transportation problem via LP** (or otherwise I guess)

A plant located in Glasgow (Gw) and a plant located in Guildford (Gd) produce 300 and 500 units of a product respectively. These units have to be distributed to 3 warehouses (W1, W2, W3) located throughout the country. Each unit has a different transport cost, different production cost and different demand. Given the information in the diagram below, how many units should be made where and sent where to minimise the overall cost to supply the demand at the 3 warehouses?



1. **Card game exercise (two players, or try it out with two teams)**

Given the set of rules given below

1. is the game fair?
2. who is most likely to win?
3. what is the best strategy if you are red?
4. is there a best strategy if you are black?

You have 8 cards: 4 black, 4 red. One player (team) has the black cards, one player (team) has the red cards. The four cards are as follows:

Ace (1), 2, 3, King

Each player selects a card and then plays the card at the **same time**.

The red player (team) wins if

* both Kings are played
* A king is not played and the value of the cards are different

The black player (team) wins if

* a King is played by only one player
* the value of the cards are the same, but the value is not a King.

A score sheet:



1. **Visit the Matlab optimisation area**

In particular, please work through (note these are solved problems, but copy out the code and comment it to (virtual) death so you know what it is doing and why… if you come across terminology you don’t understand and cant figure out, post it on the [discussion board](https://canvas.bham.ac.uk/courses/35159/discussion_topics/416599))

1. blending problem (<https://uk.mathworks.com/help/optim/examples/production-planning-fertilizer-blending-plant.html>)
2. location problem (<https://uk.mathworks.com/help/optim/ug/factory-example-problem-based.html>)
3. find the Banana function, Soduku, Log cutting (etc) (via <https://uk.mathworks.com/help/optim/examples.html>)

This is here simply so I have it at full scale to be able to edit in future (PTR)

Supply

300

500

Demand

200

300

250

Transport cost

£10

£8

£6

£5

£7

£9

800

750